IN THE CLAIMS

Please cancel Claims 1 – 100.

Claims 1 – 100 (cancelled)

Please add the following new claims:

101. (new) A particle comprising:

a particulate substrate; and

a thermoplastic polymer present on or in the substrate in an amount sufficient to improve the dust suppression of the particle above that which would occur if the thermoplastic polymer was absent.

102. (new) The particle of claim 101, wherein the thermoplastic polymer has a glass transition temperature of at most about 50 degrees C.

103. (new) The particle of claim 101, wherein the thermoplastic polymer comprises an amorphous polymer having a glass transition temperature of at most about 50 degrees C.

104. (new) The particle of claim 101, wherein the thermoplastic polymer comprises a semi-crystalline polymer having a softening point in the range of 40 to 80 degrees C.

105. (new) The particle of claim 101, having an absence of a thermosetting resin.

106. (new) The particle of claim 101, wherein the substrate is selected from at least one member of the group consisting of sand, ceramic particles, nut flour, and glass beads.

107. (new) The particle of claim 101, further comprising at least one layer of a thermosetting resin coating substantially surrounding the substrate to form a coated particle.

108. (new) The particle of claim 107, wherein at least one said layer of a thermosetting resin coating further comprises filler particles.

109. (new) The particle of claim 101, wherein the thermoplastic polymer is selected from the group consisting of homopolymers of C1-C12 alkyl(meth)acrylates, olefin polymers and copolymers, copolymers of olefins with acrylates, styrene or anhydrides, butadiene homopolymers with or without functionality at their chain ends, butadiene-acrylonitrile copolymers with or without functionality at their chain ends, and mixtures thereof.

110. (new) The particle of claim 107, wherein the thermosetting resin is a phenol-aldehyde, epoxy, urea-aldehyde, furfuryl alcohol, melamine-aldehyde, polyester, alkyd, novolac, furan resin, or a combination comprising at least one of the foregoing thermosetting resins.

111. (new) The particle of claim 101, wherein the particulate substrate comprises a single particle.

112. (new) The particle of claim 101, wherein the substrate is a composite particle comprising a binder, and wherein filler particles are homogeneously disbursed throughout the binder.

113. (new) The particle of claim 112, wherein a thermoplastic polymer is located on a surface of the composite particle.

114. (new) The particle of claim 101, wherein the thermoplastic polymer comprises a member selected from the group consisting of ethylene-n-butyl acrylate copolymer, n-butyl acrylate homopolymer and mixtures thereof.

115. (new) The particle of claim 101, wherein the thermoplastic polymer comprises up to about 10 weight percent of polyvinyl acetal and polyvinyl butyral, based on the total weight of the thermoplastic polymer on a dry basis.

116. (new) The particle of claim 101, wherein the thermoplastic polymer comprises a member selected from the group consisting of butadiene homopolymers and butadiene-acrylonitrile copolymers.

117. (new) The particle of claim 101, wherein the thermoplastic polymer comprises a member selected from the group consisting of butadiene homopolymers and butadiene-acrylonitrile copolymers with functionality at their chain ends, and wherein the functionality comprises functional groups selected from the group consisting of carboxy, amine, methacrylate and epoxy.

118. (new) The particle of claim 101, wherein the thermoplastic polymer comprises an ethylene-n-butyl acrylate copolymer having functional groups selected from the group consisting of carboxy, amine, methacrylate and epoxy.

119. (new) The particle of claim 101, wherein the thermoplastic polymer is selected from the group consisting of: a carboxyl terminated butadiene-acrylonitrile with an acrylonitrile content of about 10%, a Tg of about minus 50 to minus 77 degrees C, a Brookfield viscosity of about 60,000 MPa, and a carboxyl content of about 25%; a methacrylate vinyl terminated butadiene-acrylonitrile copolymer with an acrylonitrile content of about 18%, a Tg of up to about minus 49 degrees C, and a Brookfield viscosity of about 50000 MPa; an amine terminated butadiene-acylonitrile copolymer with an acrylonitrile content of about 18%, a Tg of up to about minus 59 degrees C, and a Brookfield viscosity of about 100000 MPa; and a combination comprising at least one of the foregoing thermoplastic polymers.

120. (new) The particle of claim 101, wherein the particle has a turbidity of 5 to 200 NTU.

121. (new) The particle of claim 101, wherein the particle comprises 0.005 to 4.0 weight percent of the thermoplastic polymer, based upon weight of the particle.

122. (new) The particle of claim 107, wherein the coating comprises 0.05 to 100 weight percent of the thermosetting resin, based upon weight of the particle.

123. (new) The particle of claim 101, wherein upon being subjected to a 60 minute ball mill test the particle achieves a turbidity measurement of less than 200 NTU at 30 minutes ball mill time and/or less than 300 NTU at 60 minutes ball mill time.

124. (new) The particle of claim 101, wherein upon being subjected to a 60 minute ball mill test the particle achieves a turbidity measurement of less than 100 NTU at 30 minutes ball mill time and/or less than 150 NTU at 60 minutes ball mill time.

125. (new) The particle of claim 101, further having at least one curable thermosetting resin coating and a UCS of at least 85% of a control particle which has the same composition but lacks the thermoplastic polymer.

126. (new) The particle of claim 101, further having at least one precured thermosetting resin coating which reduces the fracture tendency of the coated particle, as measured by a crush resistance test, by at least 20% when compared to a control particle which has the same composition except for the thermoplastic polymer.

127. (new) The particle of claim 101, further having at least one precured thermosetting resin coating which reduces the fracture tendency of the coated particle, as measured by a crush resistance test, by at least 10% when compared to a control particle which has the same composition except for the thermoplastic polymer.

128. (new) The particle of claim 101, having at least one precured thermosetting resin coating and having sufficient thermoplastic polymer to have a crush strength of at least equal to that of a control particle which has the same composition, but lacks the thermoplastic polymer.

129. (new) The particle of claim 101, wherein the particle displays reduced abrasion towards other particles, handling equipment and/or down hole tubular objects and/or equipment as compared with substrate particles that lack the thermoplastic polymer.

130. (new) The particle of claim 101, having sufficient thermoplastic polymer to reduce water pickup by the particle of 20 weight percent when compared with a particle that lacks the thermoplastic polymer.

131. (new) The particle of claim 101, having sufficient thermoplastic polymer to result in a particle having at least 10% of a reduction in weight loss under an API RP 56 acid resistance test as compared to a particle which is the same but lacks the thermoplastic polymer.

132. (new) The particle of claim 101, having sufficient thermoplastic polymer to result in a storage stability of 24 hours when stored at 95% relative humidity at a temperature of 104 degrees F.

133. (new) The particle of claim 101, wherein the amount of thermoplastic polymer is sufficient to produce reduced agglomeration, and wherein clusters and other oversized clumps are reduced by an amount effective to produce a yield improvement of at least 2 to 5% when compared with particle that lack the thermoplastic polymer.

134. (new) The particle of claim 101, wherein the thermoplastic polymer present on or in the substrate improves the crush resistance and/or the abrasive properties and/or

the acid resistance of the particle above that which would occur if the thermoplastic polymer was absent.

135. (new) A method for manufacturing a particle comprising:

heating a particulate substrate; and

disposing upon the particulate substrate, a thermoplastic polymer in an amount sufficient to improve the dust suppression and / or crush resistance and/or acid resistance and/or abrasion resistance of the particle above that which would occur if the thermoplastic polymer was absent.

136. (new) The method of claim 135, comprising mixing the thermoplastic polymer with the particulate substrate after the particulate substrate is heated to temperatures of about 225° to 550°F.

137. (new) The method of claim 135, further comprising the steps of mixing a thermosetting resin with the particulate substrate at temperatures of about 225° to 550°F, to form a thermosetting resin coating on the particulate substrate.

138. (new) The method of claim 135, wherein the disposing comprises the steps of mixing the thermoplastic polymer with the particulate substrate preheated to temperatures of about 225° to 550°F, and further adding a thermosetting resin to form a thermosetting resin coating on the particulate substrate.

139. (new) The method of claim 137, wherein the thermosetting resin is in the form of novolac flakes, and wherein the novolac flakes are added to the preheated particulate substrate to form a mixture, and wherein a thermoplastic polymer is further added to the mixture about 30 to 90 seconds after the flakes are added to the particulate substrate.

140. (new) The method of claim 139, wherein the novolac flakes contains filler particulates or wherein the filler particulates are added concurrently with the novolac flakes.

141. (new) The method of claim 137, wherein the thermosetting resin is selected from the group consisting of a phenolic resole resin, a furan resin, a terpolymer of phenol, furfuryl alcohol and formaldehyde, phenol formaldehyde novolac resin and mixtures thereof.

142. (new) The method of Claim 135, wherein the particulate substrate is selected from the group consisting of sand, bauxite, zircon, ceramic particles, nut flour, glass beads, composite particles comprising a resin binder with filler particles, and mixtures thereof and has a particle size of about 8 to about 100 mesh in size.

143. (new) The method of Claim 135, wherein the substrate is a single particle and a thermosetting resin is further applied to the particulate substrate to coat the substrate, following which the thermosetting resin is cured, and following which the thermoplastic polymer is then applied to the particle.

144. (new) The method of Claim 143, wherein after the thermosetting resin has cured, the particles are coated with additional thermosetting resin and cured again, following which a thermoplastic polymer is disposed upon the additional thermosetting resin.

145. (new) The method of Claim 144, wherein the thermosetting resin comprises a resole resin and the additional thermosetting resin comprises a polyurethane resin or an alkaline modified resole curable with ester.

146. (new) The method of Claim 135, further comprising granulating the particles.

147. (new) The method of Claim 135, further comprising coating the particle with a thermosetting resin that contains dispersed filler particles, wherein the filler particles have an average grain size of 4 to 10 micrometers.

148. (new) A method of treating a hydraulically induced fracture in a subterranean formation surrounding a wellbore comprising introducing a proppant comprising free flowing particles of Claim 101 into the fracture.

149. (new) The method according to Claim 148, wherein a pack comprising the particles is formed in the formation.

150. (new) A method of treating a hydraulically induced fracture in a subterranean formation surrounding a wellbore comprising introducing a proppant comprising free flowing particles of Claim 107 into the fracture.

151. (new) The method according to Claim 150, wherein a pack comprising the particles is formed in the formation.

152. (new) A method for treating a subterranean formation comprising:

applying to the subterranean formation a particulate comprising a particulate substrate upon which is disposed a thermoplastic polymer and a hydraulic fracturing fluid.

153. (new) The method for treating a subterranean formation of claim 152, wherein the particulate substrate further has a curable thermosetting coating and wherein the curable thermosetting coating undergoes curing within fractures of the subterranean formation.

154. (new) The method for treating a subterranean formation of claim 152, further comprising introducing the particles into the well bore forming a gravel pack about a wellbore and about a containment area.

155. (new) A method for treating a subterranean formation comprising:

applying to the subterranean formation a particulate comprising a particulate substrate upon which is disposed a thermoplastic polymer, a thermosetting resin and a hydraulic fracturing fluid.

156. (new) The method for treating a subterranean formation of claim 155, further comprising introducing the particles into the well bore forming a gravel pack about a wellbore and about a containment area.

157. (new) A particle comprising:

a particulate substrate; and

a thermoplastic polymer, wherein the particle has a turbidity of about 10 to 200 NTU after a one hour ball mill test and wherein the particle has a compressive strength retention of greater than about 50% as measured by a UCS test when compared with a particle having that does not comprise the thermoplastic polymer.

158. (new) The particle of claim 157, wherein the particle further comprises a first thermosetting resin coating and optionally a second thermosetting resin coating, and wherein the first thermosetting resin and the second thermosetting resin are phenol-aldehydes, epoxies, urea-aldehydes, furfuryl alcohols, melamine-aldehydes, polyesters, alkyds, novolacs, furan reins, or a combination comprising at least one of the foregoing thermosetting resins, and wherein the particle further comprises an outermost coating that comprises a thermoplastic polymer.

159. (new) The particle of claim 158, wherein the first thermosetting resin coating comprises a first curative in an amount sufficient to at most partially cure the first thermosetting resin and wherein the second thermosetting resin coating comprises a second curative in an amount sufficient to at most partially cure the second thermosetting resin coating.

160. (new) A particle comprising:

a particulate substrate;

a thermoplastic polymer; and

a thermosetting resin, wherein the particle has a turbidity of about 10 to 200 NTU after a one hour ball mill test and has a compressive strength retention of greater than about 50% as measured by a UCS test when compared with a particle that does not comprise the thermoplastic polymer.

161. (new) A particle comprising:

a particulate substrate;

a thermoplastic polymer; and

a thermosetting resin, wherein the thermoplastic polymer is present in an amount sufficient to improve the dust suppression and / or crush resistance and/or acid resistance and/or abrasion resistance of the particle above that which would occur if the thermoplastic polymer was absent.

162. (new) The particle of claim 161, wherein the thermoplastic polymer has a glass transition temperature of at most about 50 degrees C.

163. (new) The particle of claim 161, wherein the particulate substrate is selected from the group consisting of sand, ceramic particles, nut, flour, and glass beads

164. (new) The particle of claim 161, wherein the thermosetting resin substantially surrounds the substrate to form a coated particle.

165. (new) The particle of claim 164, the thermosetting resin comprises at least one layer that comprises filler particles.

166. (new) The particle of claim 161, wherein the thermoplastic polymer is selected from the group consisting of homopolymers of C1-C12 alkyl(meth)acrylates, olefins, copolymers of olefins with acrylates, styrene or anhydrides, butadiene homopolymers with or without functionalities at their chain ends, butadiene-acrylonitrile copolymers with or without functionality at their chain ends, and mixtures thereof.

167. (new) The particle of claim 161, wherein the thermosetting resin is a phenol-aldehyde, epoxy, urea-aldehyde, furfuryl alcohol, melamine-aldehyde, polyester, alkyd, novolac, furan resin, or a combination comprising at least one of the foregoing thermosetting resins.

168. (new) The particle of claim 161, wherein the particulate substrate is a composite particle comprising binder and filler particles homogeneously dispersed throughout the binder.

169. (new) The particle of claim 168, wherein a thermoplastic polymer is located on a surface of the composite particle.

170. (new) The particle of claim 161, wherein the thermoplastic polymer forms a blend with the thermosetting resin.

171. (new) The particle of claim 161, wherein the thermoplastic polymer comprises a member selected from the group consisting of ethylene-n-butyl acrylate copolymer, n-butyl acrylate homopolymer and mixtures thereof.

172. (new) The particle of claim 161, wherein the thermoplastic polymer comprises a member selected from the group consisting of butadiene homopolymers and butadiene-acrylonitrile copolymers.

173. (new) The particle of claim 161, wherein the thermoplastic polymer is selected from the group consisting of butadiene homopolymers having functional groups at their chain ends and butadiene-acrylonitrile copolymers having functional groups at their chain ends, wherein the functional groups are selected from the group consisting of carboxy, amine, methacrylate and epoxy.

174. (new) The particle of claim 161, wherein the thermoplastic polymer comprises an ethylene-n-butyl acrylate copolymer having functional groups selected from the group consisting of carboxy, amine, methacrylate and epoxy.

175. (new) The particle of claim 161, wherein the thermoplastic polymer comprises a polymer selected from the group consisting of a carboxyl terminated butadiene-acrylonitrile with an acrylonitrile content of about 10%, a Tg of about minus 50 to minus 77 degrees C, a Brookfield viscosity of about 60,000 MPa, and a carboxyl content of about 25%; a methacrylate vinyl terminated butadiene-acrylonitrile copolymer with an acrylonitrile content of about 18%, a Tg of up to about minus 59 degrees C, and a Brookfield viscosity of about 50000 MPa; an amine terminated butadiene-acrylonitrile copolymer with an acrylonitrile content of about 18%, a Tg of up to about minus 59 degrees C, and a Brookfield viscosity of about 100000 MPa; or a combination comprising at least one of the foregoing thermoplastic polymers.

176. (new) The particle of claim 161, wherein the particle has a turbidity of 5 to 200 NTU.

177. (new) The particle of claim 161, wherein the particle comprises 0.005 to 4.0 weight percent of the thermoplastic polymer based upon weight of the particle.

178. (new) The particle of claim 161, wherein upon being subjected to a 60 minute ball mill test, the particle achieves a turbidity measurement of less than 200 NTU at 30 minutes ball mill time and/or less than 300 NTU at 60 minutes ball mill time.

179. (new) The particle of claim 161, wherein the particle, upon being subjected to a 60 minute ball mill test achieves a turbidity measurement of less than 100 NTU at 30 minutes ball mill time and/or less than 150 NTU at 60 minutes ball mill time.

180. (new) The particle of claim 161, further having at least one precured thermosetting resin coating which reduces the fracture tendency of the coated particle, as measured by a crush resistance test, by at least 10% compared to a control particle which lacks the thermoplastic polymer.

181. (new) The particle of claim 161, having at least one precured thermosetting resin coating and having sufficient thermoplastic polymer to have a crush strength at least equal to that of a control particle which lacks the thermoplastic polymer.

182. (new) The particle of claim 161, wherein the particle displays reduced abrasion towards other particles, handling equipment and/or down hole tubular objects and/or equipment as compared with another particle that lack the thermoplastic polymer.

183. (new) The particle of claim 161, having sufficient thermoplastic polymer to reduce water pickup by the particle of 20% as compared with a particle that lacks the thermoplastic polymer.

184. (new) The particle of claim 161, having sufficient thermoplastic polymer to result in a particle having at least 10 % of a reduction in weight loss under an API RP 56 acid resistance test as compared to a particle that lacks the thermoplastic polymer.

185. (new) The particle of claim 161, having sufficient thermoplastic polymer to produce particles that are flowable after 24 hours of being stored at 95% relative humidity and 104 degrees F.

186. (new) The particle of claim 161, wherein the amount of thermoplastic polymer is sufficient to produce reduced agglomeration, and wherein clusters and other oversized clumps are reduced by an amount effective to produce a yield improvement of at least 2 to 5% when compared with particle that lack the thermoplastic polymer.

187. (new) A method for manufacturing a particle comprising:

heating a particulate substrate;

disposing upon the particulate substrate, a thermosetting resin; and

disposing upon the particulate substrate and/or the thermosetting resin, a thermoplastic polymer in an amount sufficient to improve the dust suppression and / or crush resistance and/or acid resistance and/or abrasion resistance of the particle above that which would occur if the thermoplastic polymer was absent.

188. (new) A particle comprising:

a substantially homogeneous formed particle comprising:

a core comprising a binder and filler particles dispersed throughout the binder, wherein particle size of the filler particles ranges from about 0.5 to about 60 μm; wherein the particle has a bulk density of 0.50 to 1.30 grams per cubic centimeter, and a grain density of 0.90 to about 2.2 gr/cm^3; and wherein the particle optionally has a resin coating; and

a thermoplastic polymer, wherein the thermoplastic polymer has a glass transition temperature of at most 50 degrees C and is selected from the group consisting of homopolymers of C1-C12 alkyl(meth)acrylates, copolymers of olefins with C1-C12 alkyl(meth)acrylates, butadiene homopolymers, butadiene-acrylonitrile copolymers, and a semicrystalline polymer.

189. (new) A proppant pack comprising the particles of claim 101, after the particles are placed in a well bore.

190. (new) A proppant pack comprising the particles of claim 107, after the particles are placed in a well bore.

191. (new) A proppant pack comprising the particles of claim 157, after the particles are placed in a well bore.

192. (new) A proppant pack comprising the particles of claim 160, after the particles are placed in a well bore.

193. (new) A proppant pack comprising the particles of claim 161, after the particles are placed in a well bore.

194. (new) A proppant pack comprising the particles of claim 188, after the particles are placed in a well bore.

195. (new) A foundry particle comprising the particles of Claim 101.

196. (new) A foundry core or mold comprising the particles of Claim 101.

197. (new) A foundry particle comprising the particles of Claim 107.

198. (new) A foundry core or mold comprising the particles of Claim 107.

199. (new) A foundry particle comprising the particles of Claim 161.

200. (new) A foundry core or mold comprising the particles of Claim 161.